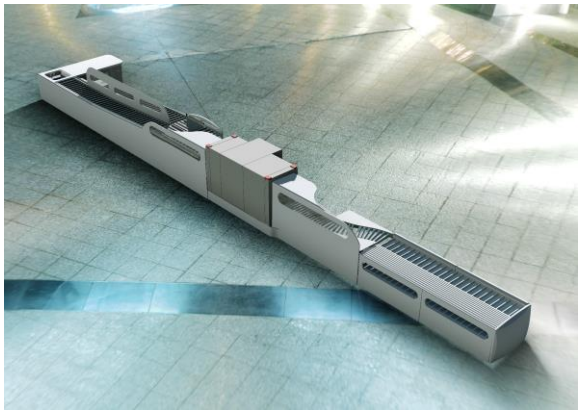
# Automation Systems Within Security Screening Areas

Presented by

Colin James

MacDonald Humfrey Automation Limited





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# Introduction



- What is the Problem Being Faced by Airports?
  - Need for Increased Security
  - Having to Prove Their Compliance
  - Keeping Their Customers Happy; Airlines and Passengers
  - Keeping Their Stakeholders Happy
  - Increasing Operating Costs; Resource and Equipment
  - Lack of Capacity to Deal with Increasing Passenger Numbers
  - Inefficiencies
  - Need for Higher Throughput
  - Building Constraints
  - Queues
  - Lack of Data to Identify The Root Cause and Effect of the Problem
- The Answer……. Automation Systems? Mach-Secure Products?


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# Our Company



- A Private Company Providing Automation Systems for Aviation, Automotive and Logistics Industries for over 27 Years
- In 2007 we Embarked on Developing Hardware and Software Products to Improve Security, Compliance and Performance of Outbound Security Systems
- The Largest Integrator of Tray Return Systems; Having the Largest Number of Reference Sites and the Largest Install Base
- We have Experience Working in All Sizes of Airports; From 2 to 130 Lanes
- First Company to Install a Full Directive Search System
- First Company to 'Go live' with a Remote Screening System
- We have a Portfolio of Products Providing a Holistic Approach to a Fully Integrated Security Screening Area


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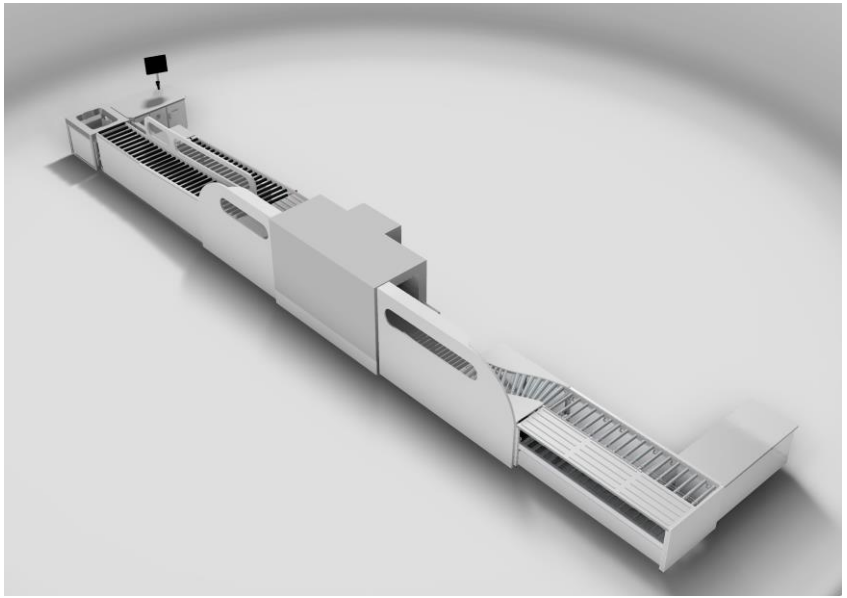
# The Drivers for Automation



- Enhance Security
- Improve Compliance
- Reduce Overall Operational Costs
- Eliminate Inefficiencies
- Improve Staff Performance
- Minimise Manual Handling
- Improve Passenger Experience
- Reduce Waste; Time and Effort

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# How to Meet the Objectives



- Introduce Lean Manufacturing Processes
- Introduction of Automated Systems
- Provide Software ‘Tools’ to Efficiently Manage the Operations, Provide Real Time Data of System and Personnel Performance
- Provide Visual Feedback Systems to Staff and Passenger
- Creating Teamwork within the Security Staff
- Instil Good working Practices for Staff to Excel in their Job Function
- Review Job Roles and Responsibilities – Deploy ‘Best At’ Job Roles
- Remove Unnecessary Dialogue Between Security Staff Whilst in an Operational Environment


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# Some of the Challenges



- Creating Space for Automated Systems
- Reluctance for Change by Staff
- Engagement of Unions
- Engagement of Staff During Trials
- Early Engagement with Stakeholders, Architects, Builders During the Design Phase of a Terminal Development Project
- Raising CapEx for the Project
- Interaction with Airport IT
- Engagement of Local Maintenance Staff
- Selection of the Right Staff to Lead the Teams
- Selection of the Right Staff to Carry out Job Functions


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# Where This Has Worked



- Supplier Worked as Part of the Development Team
- Provided a Flexible design for Tray Handling System
- Engaged with the Stakeholders and their Agents; Provided Designs, Simulation and Modelling for Visualisation
- Engaged Trials Teams to Promote the Systems and Support Local Staff
- Supplier Provides or Engaged with Local Companies for Support
- Provided Management, Staff and Compliance Software; i.e.
  - SEMs, SmartARCs, SmartPredict, SmartRoster, SmartTutorial


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# Mach-Secure®



## What Is:

### Mach-Secure®

A suite of Mach-Smart Products designed to increase security and efficiency for security checkpoint applications

## What Is:

### Mach-SEMS®

**Security, Efficiency and Management System**

provides the Business with real time Equipment Status, KPI's, and Passenger throughputs with powerful analytic tools and historical reports.

## What Is:

### Mach-Smart Products

MacDonald Humfrey registered Mach-Smart Products, Applications and Services


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# MachSecure® SEMS Process



## Inputs

- MachSecure® Products
  - SmartLane®
  - SmartView®
  - SmartGate®
  - SmartAccess® etc…
- Airport
  - AODB's
  - DCS's
  - SAC's etc…
- 3rd Party Interfaces

## SEMS®

- Centralised Data Storage
  - Equipment & Process Events
  - Operator Actions & Logins
  - Training Data & Profiles
  - Process Parameters & Profiles
- Operational Services
  - Smart Product Interfaces
  - 3rd Party Interfaces

## Outputs

- SEMS Clients
  - Business Information
    - Historical & Commercial Reports
    - Statistical Data
  - Supervisors
    - Status Overviews
    - Real Time KPI's & Alerts
    - Planning Tools
    - Equipment and Personnel Performance
  - IT/Engineering
    - Diagnostic Tools
    - Configuration
    - Reporting


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# Mach-Secure® Products



- **SEMS**
  - Security Efficiency Management Systems
- **Mach-SmartLane**
  - OBS Automated Tray Return
- **Mach-SmartView**
  - Directive Search Facility
- **Mach-SmartView Matrix**
  - Remote Screening Directive Search Facility
- Mach-SmartTutorial
  - On the Job CBT Training Solution
- Mach-SmartARCS
  - Airport Regulatory Compliance System
- Mach-SmartPupil
  - Security Vigilance Monitoring System
- Mach-SmartAccess
  - Automated Boarding Pass Access Control
- Mach-SmartGate
  - Automated AMD Routing Solution
- Mach-SmartSense
  - Checkpoint Personnel & Asset Tracker
- Mach-SmartRoster
  - Intelligent / Dynamic Staff Roster System
- Mach-SmartPredict
  - Passenger & Equipment Resource Forecasting
- Mach-SmartDrop
  - Passenger Automated Check In Self Bag Drop
- Mach-SmartSAC
  - Sort Allocation Computer System
- Mach-SmartBRS
  - Baggage Reconciliation System


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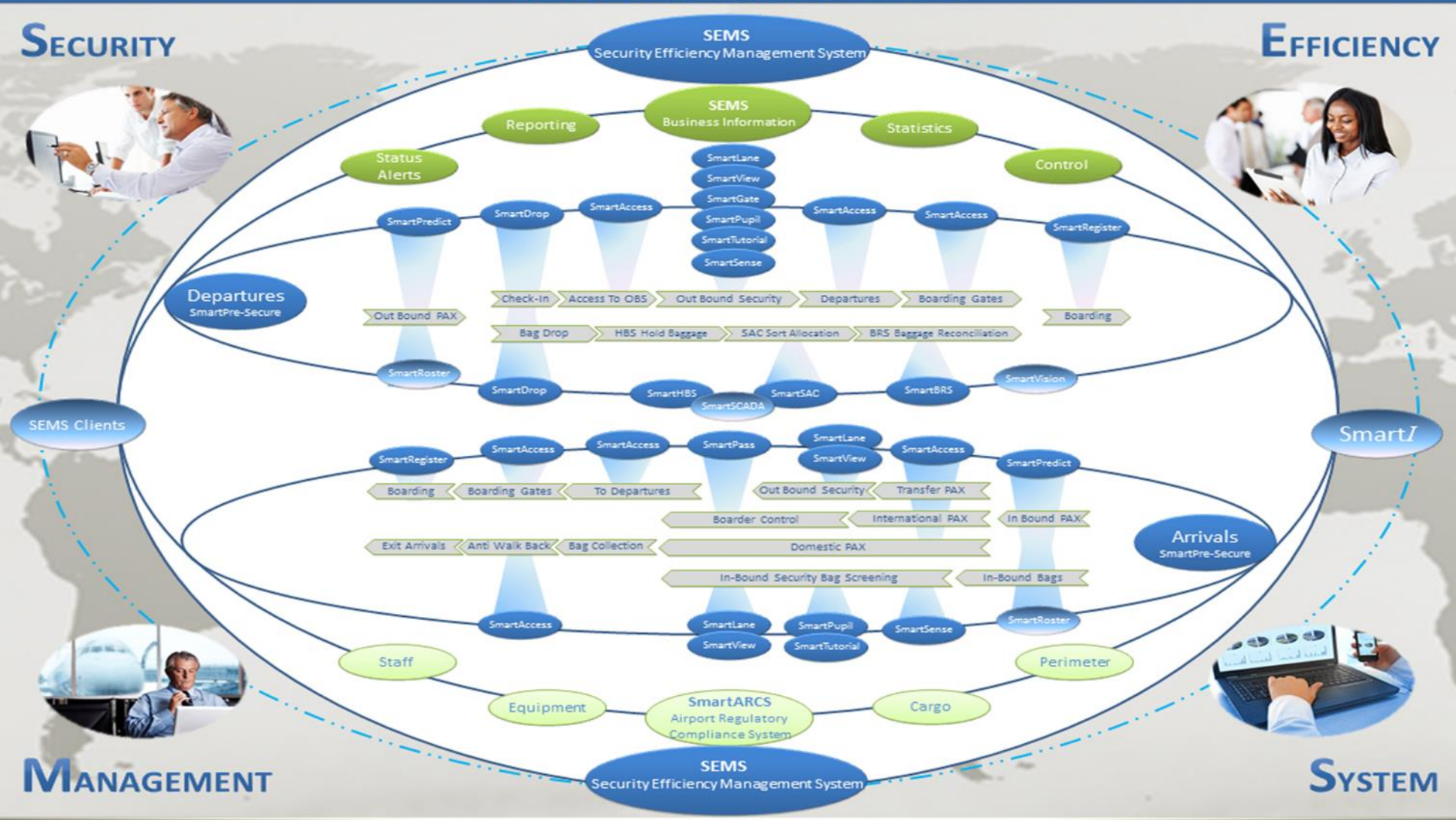
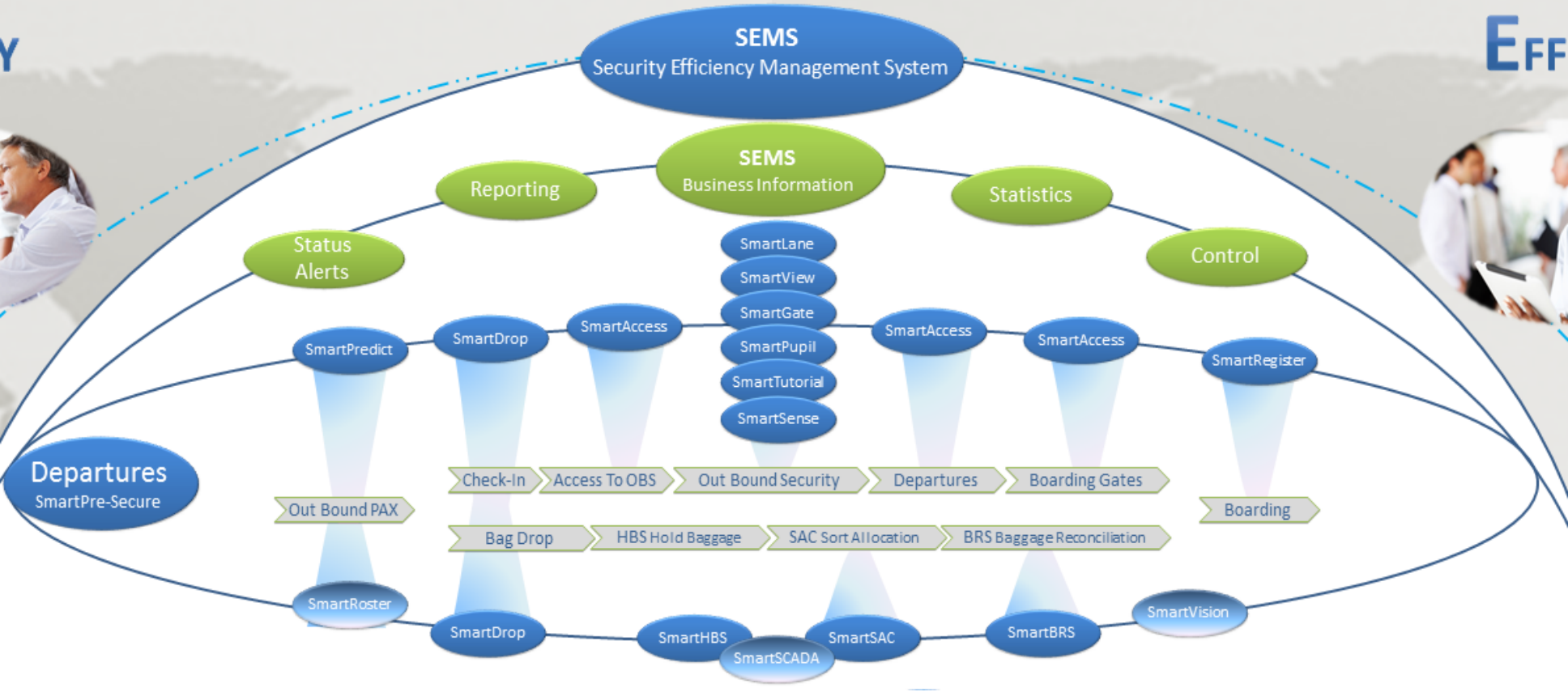
# Mach-Secure Product Solutions



# Mach-Secure Product Solutions





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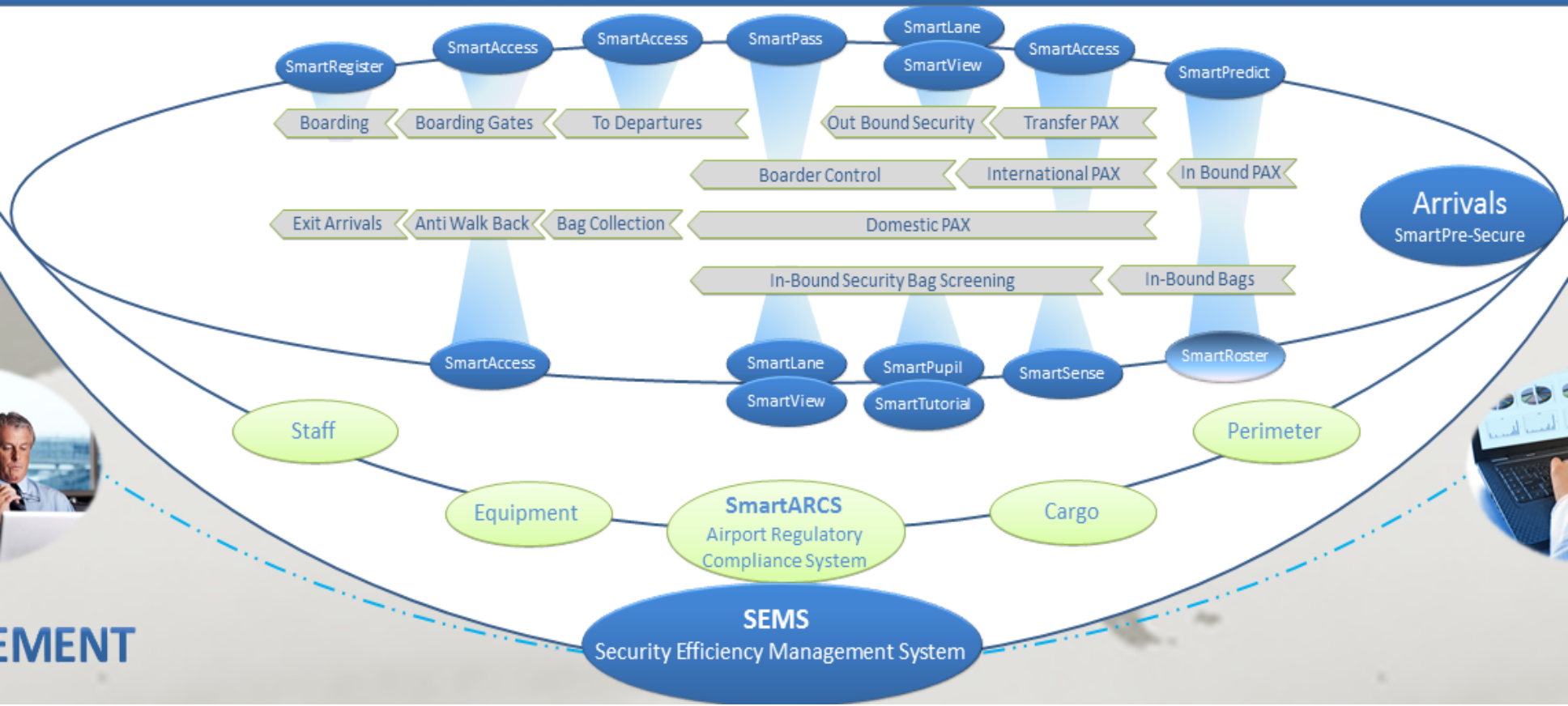
# Mach-Secure Product Solutions





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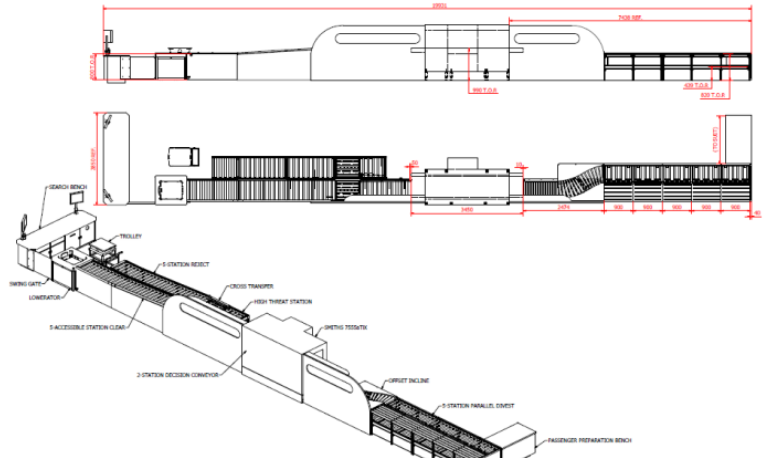
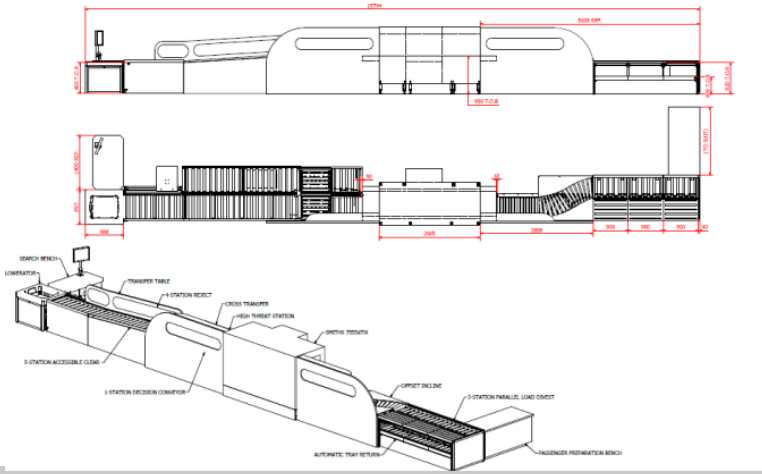
# Planning for the Optimum Size



| Experiment | Run Duration | Divest Stations | Amount Of Redress Stations | Amount Of Reject Stations | Percentage Of Rejects | Searchers Available | |
|---|---|---|---|---|---|---|---|
| Type 4 | 01:00:00 | 5 | 6 | 5 | 5 | 2 | |
| | | | | | | | |
| Clear Trays | Reject Trays | Total Trays | Blocked By Clear | Blocked By Reject | Reversing | Running | Starved |
| 571 | 34 | 605 | 3 | 0 | 4 | 69 | 24 |

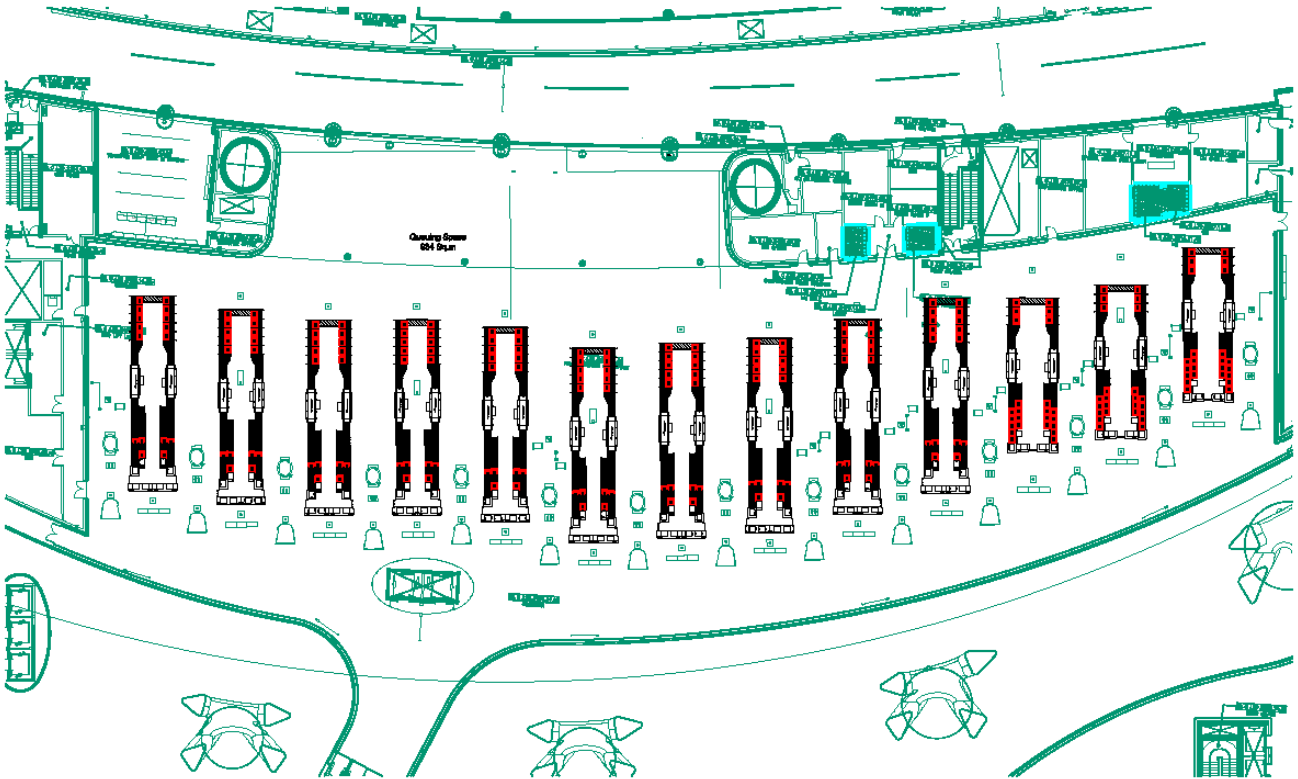
| Experiment | Run Duration | Divest Stations | Amount Of Redress Stations | Amount Of Reject Stations | Percentage Of Rejects | Searchers Available | |
|---|---|---|---|---|---|---|---|
| Type 2C | 01:00:00 | 3 | 6 | 4 | 5 | 2 | |
| | | | | | | | |
| Clear Trays | Reject Trays | Total Trays | Blocked By Clear | Blocked By Reject | Reversing | Running | Starved |
| 393 | 19 | 412 | 0 | 0 | 0 | 52 | 48 |





# Planning for the Optimum Layout



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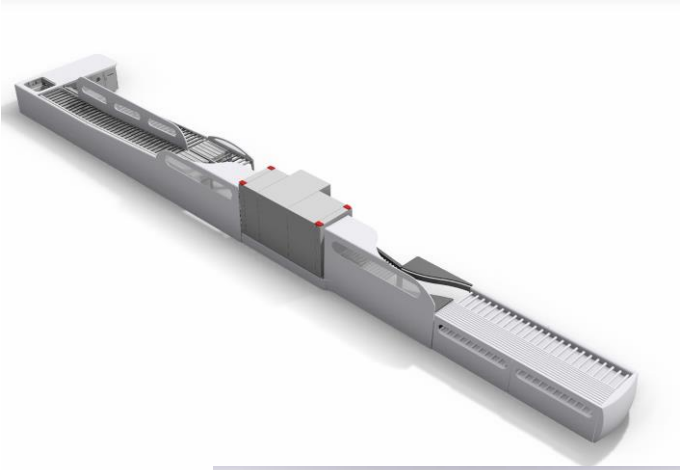
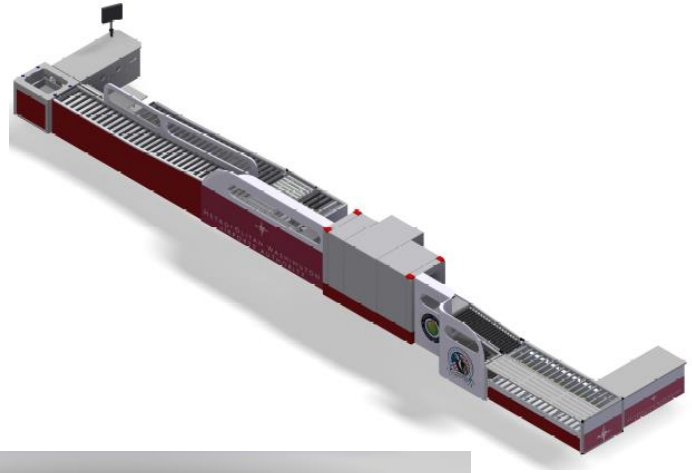
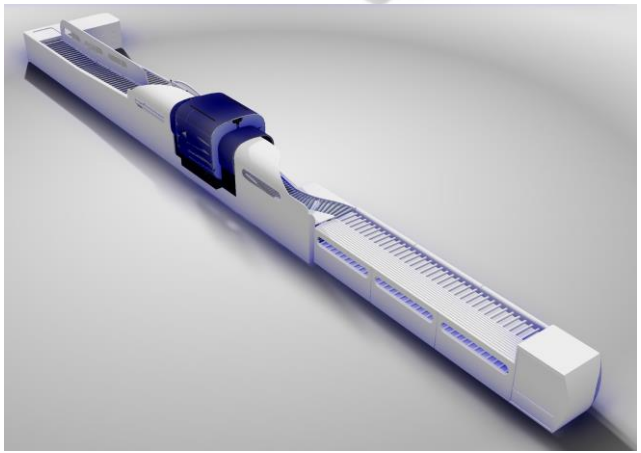
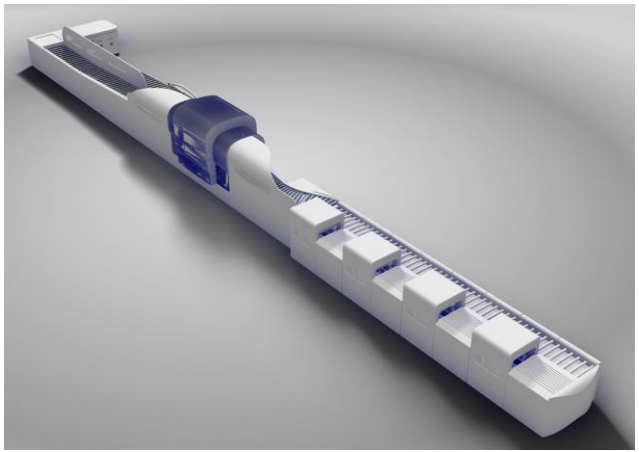
# Mach-SmartLane® Options









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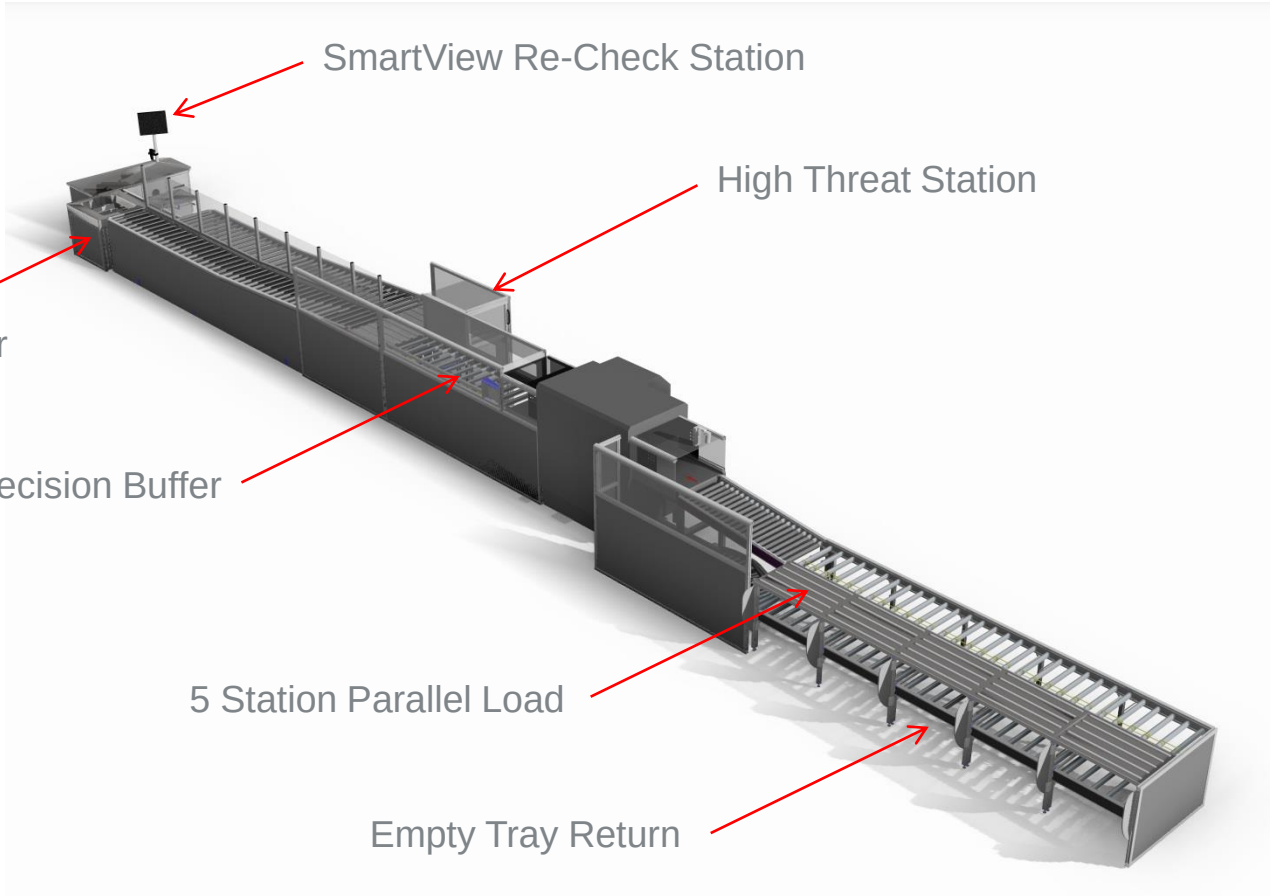
# Mach-SmartLane® (Parallel Load + Matrix Buffer)

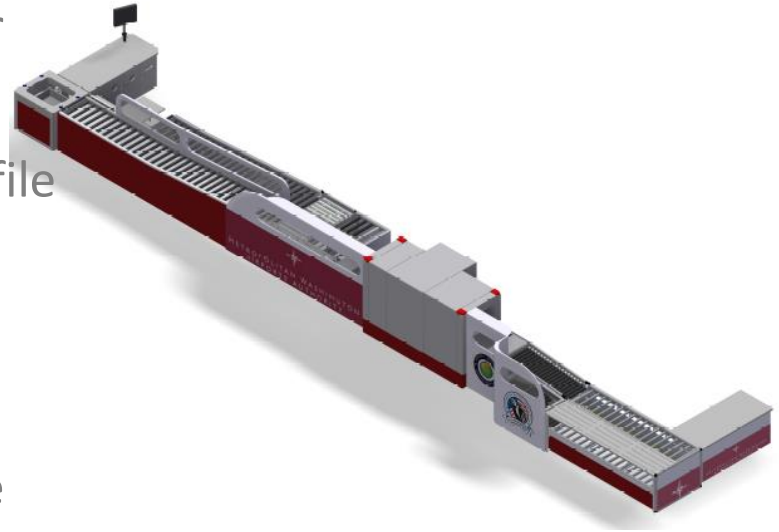




# Parallel Load Advantages



- System Flow not Inhibited by Slow Passenger
- Reduces Queues
- Variable Station Width to Suit Passenger Profile
- Easy Access of Trays by Passenger
- Quantity of Station to Suit Space Available
- Minimal Manual Handling for Staff
- Designed for Easy Cleaning and Maintenance
- Provides for Separation of Trays in to the X-ray
- Provides an Up Lift in Throughput by up to 30% on Serial / Inline Systems

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# Mach-SmartView Matrix®



- Multiple Airports Screening from a Single Location
- Multiple Terminals Screening from a Single Location
- Terminal Screening
  - Outbound Passengers
  - Staff Access
  - Vehicle Check-Point
- Completely Independent of X-Ray Machine Manufacturer
- Ability to Multiplex Different Machine Manufacturers on same Network
- No Recertification of the X-ray Machine Required

- Centralised Control Room Benefits
  - Enhanced Security
  - Improved Compliance
  - Reduce Overall Operational Costs
  - Eliminate Inefficiencies
  - Improve Staff Performance


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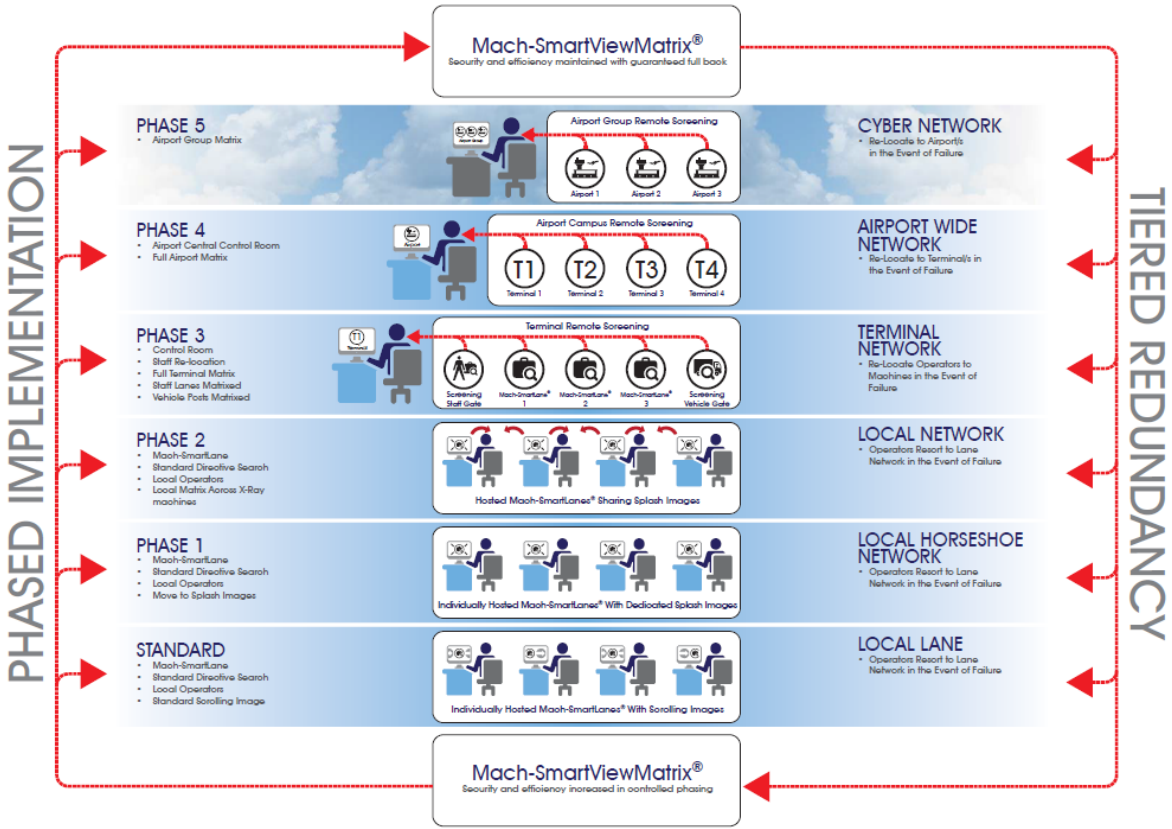
# Mach-SmartView Matrix® Redundancy



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# Mach-SmartView Matrix®



- Personnel
  - Improved Screening Performance; No Distractions or Noise
  - Personnel Dedicated to Screening; Best at the Job Role
  - Using dedicated Screeners Reduces Rotation Time
  - Screeners can be Located Landside Reducing Time for staff to get their Workplace
  - No Team Pressure - No Lane / Personnel Correlation
  - Option to Distribute Complex Images to Advance Screeners

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# Mach-SmartView Matrix®



- System Enhancements
  - Load Sharing of Images
  - Splash Image
  - Reduced Tray Separation
  - Improved Screening Conditions
  - Automatic Reject of Tray after Configured Screening Time
  - Automatic Rejection of Trays for Regulatory Test
  - Improved Distribution of TIP Images
  - No Analysing of TIP post Result
  - No Stopping of X-ray Belt
  - No Unnecessary Communications between Staff

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# Mach-SmartView Matrix®



- Visualisation

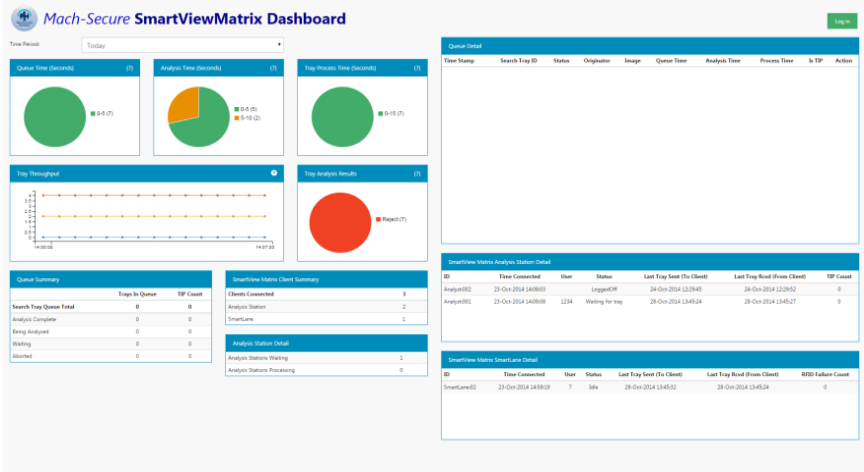
  Integrated in to SEMs for…

  – RAG Dashboards

  – KPI Reporting Dashboards

  – Real Time Statically Data

  – Real Time Reporting; Personnel Performance, Equipment Performance, Throughput Data, Threat Data, Test Data, Airline Data



# Matrix Screening



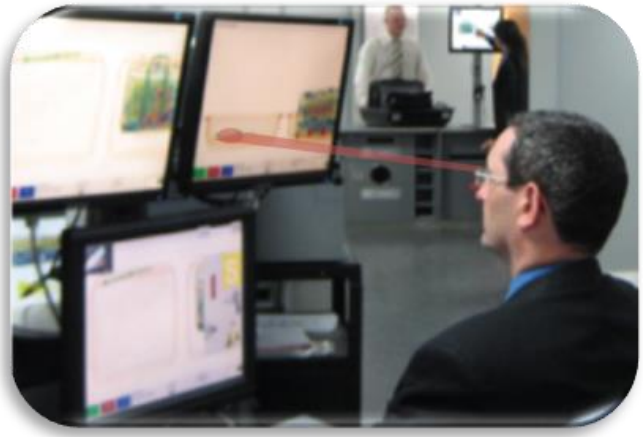
- Actual System Results
  - Tray 712mm, Gap 200mm, Conveyor Speed 200ms
  - Tray Process Time =
    (712+ 200) /200 = 4.56 sec
  - Max Throughput =
    3600 / 4.56 = 789
  - Throughput Recorded
    Current Best = 742
    Current Average = 680

- Theoretical US Throughput
  - Tray 712mm, Gap 200mm, Conveyor Speed 240ms
  - Tray Process Time =
    (712+ 200) /240 = 3.80 sec
  - Max Throughput =
    3600 / 3.80 = 947 (Increase of 20%)
  - Possible Throughput
    Current Best = 742 * 20% = 890
    Current Average = 680 * 20% = 816

# Mach-SmartPupil®



- Mach-SmartPupil®
  - Vigilance Monitoring
  - Eye Tracking
    - Tiredness/Awareness
    - Training Feedback
    - High Security

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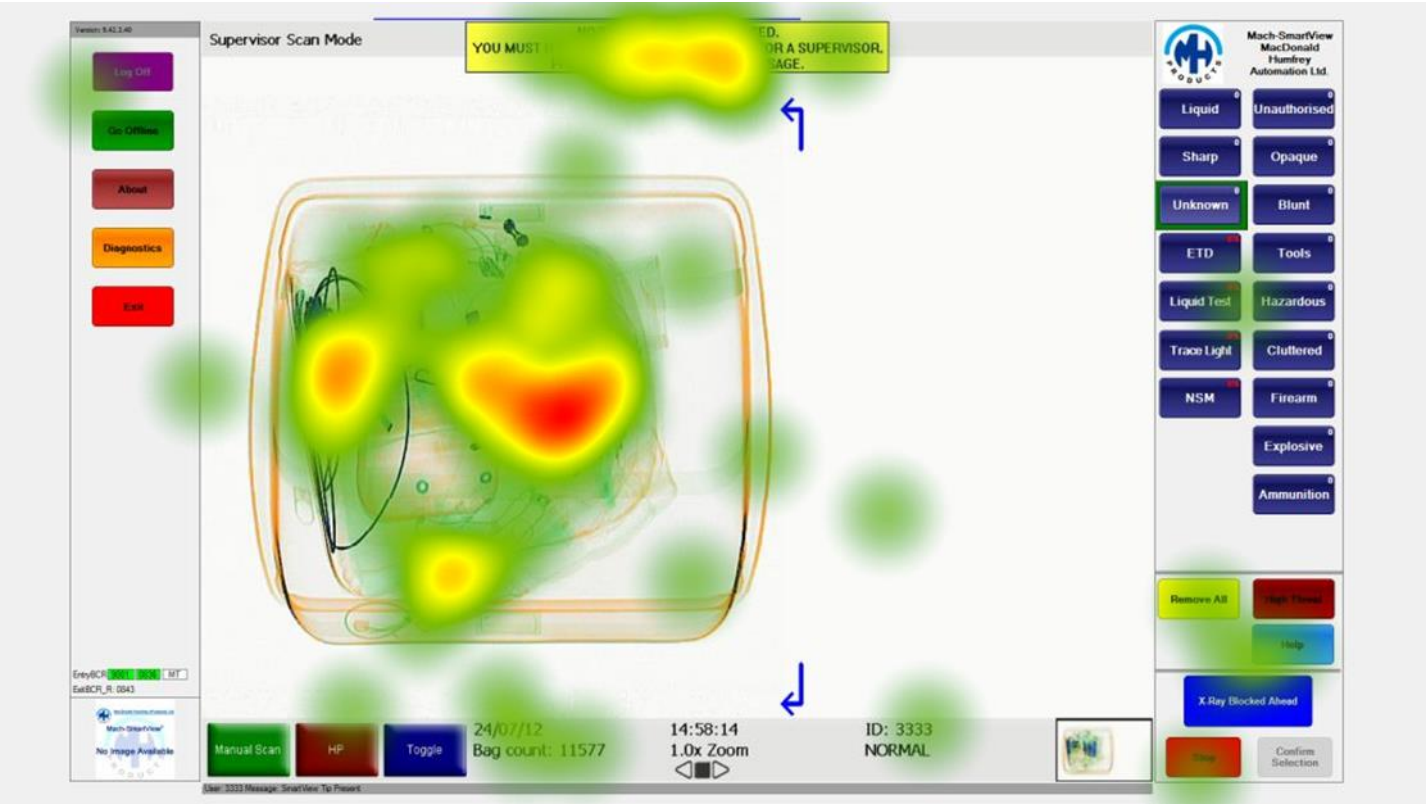
# SmartPupil Diagnostic/Training Reviews



- Dwell Time Heat Map





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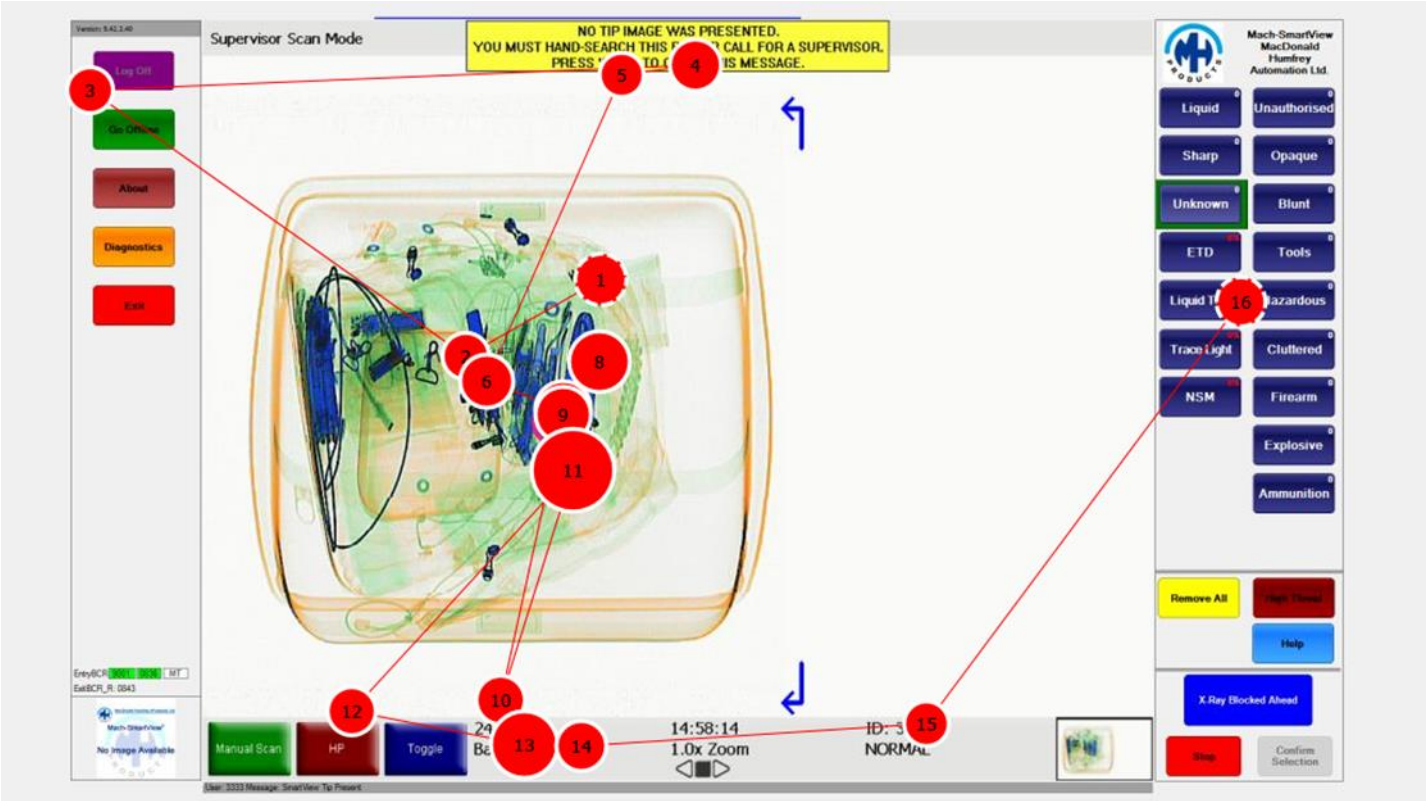
# SmartPupil Diagnostic/Training Reviews



- Sequential Gaze Plot – Partial Tray Content Coverage





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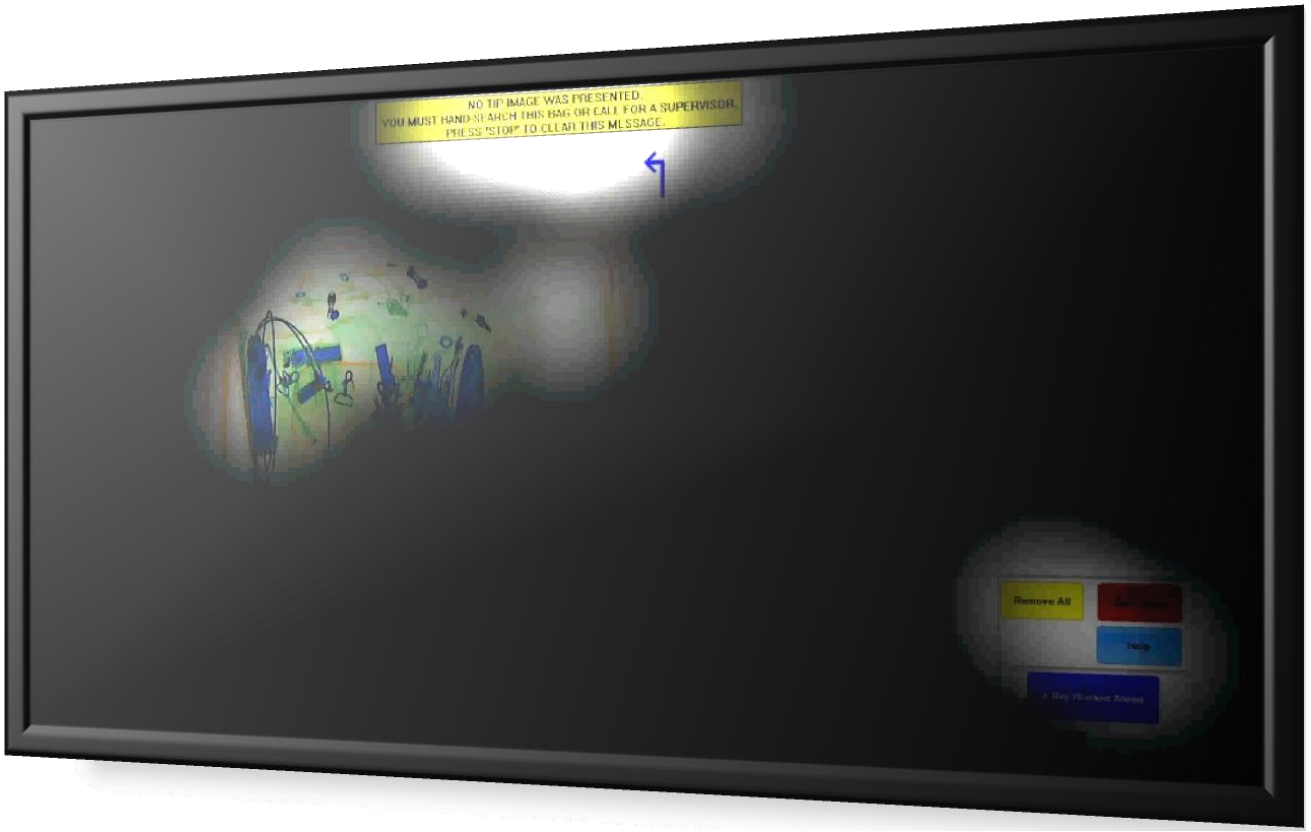
# SmartPupil Diagnostic/Training Reviews



- Opacity/Torch Gaze – Partial Tray Content Coverage





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# SmartPupil Diagnostic/Training Reviews



- Opacity/Torch Gaze – Partial Tray Content Coverage Playback

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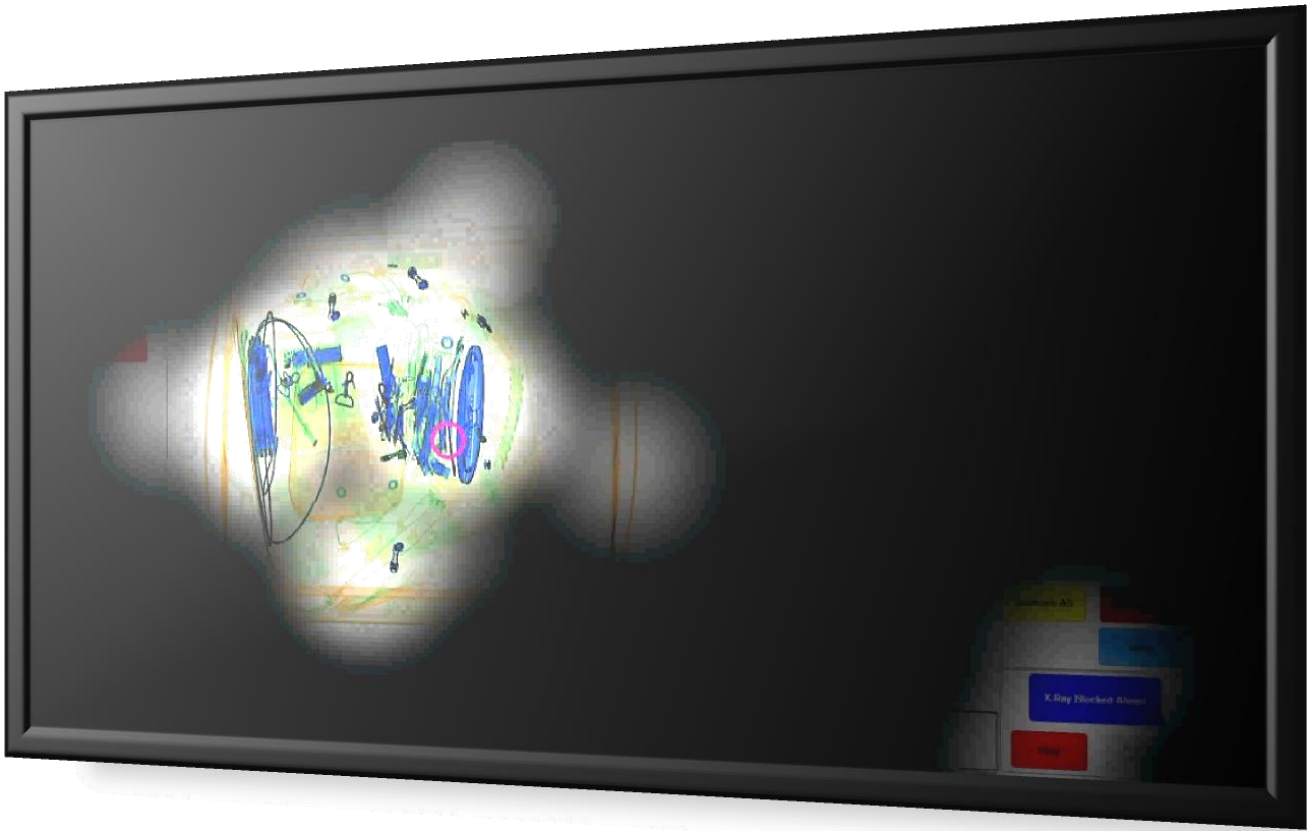
# SmartPupil Diagnostic/Training Reviews



- Opacity/Torch Gaze – Full Tray Content Coverage

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# SmartPupil Diagnostic/Training Reviews



- Opacity/Torch Gaze – Full Tray Content Coverage Playback

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# Summary



- Automation is a Proven Solution Which will Help Resolve Airports Problems
- Automation is not Just a Tray Handling System; Management Information and Reporting Tools are Important to the Overall Success
- The Introduction of Automation Comes with Challenges
- A lot of Airports are willing to Share Their Results
- Lean Manufacturing Processes will Aid the Implementation
- Partner Suppliers to Provide Technical Knowhow and Long Term Support
- Engage Early with all Parties
- Develop a Long Term Vision with a Stepped Integration Plan
- Consider All Opportunities as Small Changes Often Results in Big Wins

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# Mach-Secure®



## Thank You

## Questions & Answers


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